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Notes on Rosaceae — IV

PER AXEL RYDBERG

POTENTILLA (*continued*)*

PERMOLLES

This group contains only one species, *Potentilla permollis* Rydb. Dr. Wolf reduced this to a variety of *P. Blaschkeana*, evidently without having seen any specimen. It has a pubescence wholly unlike any species in the GRACILES or the NUTTALLIANAE groups, and although somewhat related to these, I regard it as distinct enough to be placed in a group by itself. Piper, who is rather conservative in his treatment, regards it as distinct in his Flora of Washington,† and cites three specimens.

CANDIDAE

This group contains six species, of which four are proposed as new. These are *Potentilla Elmeri*, *P. Pecten*, *P. subvillosa*, and *P. comosa*. Of these, the last one is related to *P. Bakeri*, and the rest to *P. candida*. *Potentilla Pecten* stands nearest to that species and differs mainly in the leaves, which are green above, and in the stem, which bears only a few small leaves. The following specimens belong to *P. Pecten:*

MONTANA: Bridger Mountains, 1897, *Rydberg & Bessey 4377*.

WYOMING: Cokerville, 1898, *Aven Nelson 4647;* Union Pass, *Aven Nelson 943*.

*See Bull. Torrey Club **37**: 375–386.

†Contr. U. S. Nat. Herb. vol. 11.

[The BULLETIN for September, 1910 (**37**: 443–486) was issued 5 O 1910.]

UTAH: Big Cottonwood Cañon, 1905, *Garrett 1614*.

Potentilla Elmeri resembles *P. Pecten* in habit but is silky, not at all tomentose. It is represented by the following:

CALIFORNIA: Griffins, Ventura County, 1902, *Elmer 4009;* Donner Lake, 1903, *Heller*.

Potentilla subvillosa and *P. comosa* are very local and are represented by the type collections only.

Dr. Wolf in his monograph and Professor Aven Nelson in the New Manual of Botany of the Central Rocky Mountains unite *Potentilla Bakeri* and *P. viridescens*, and the former reduces both to a variety of *P. gracilis*. *P. viridescens* is evidently related to *P. gracilis* and differs in the characters presented by Dr. Wolf; but *P. Bakeri* has the leaves dissected to near the midrib into linear or linear-oblong and obtuse, not lanceolate and acute divisions. *P. Bakeri* has spreading pubescence on the stem, and the leaves are rather densely tomentose beneath. I have collected *Potentilla Bakeri* myself in Utah and *P. viridescens* in Montana and know that they both hold their characters well. Besides the specimens cited by me in the original publication, the following represent *P. Bakeri*:

UTAH: Wahsatch County, near Midway, 1905, *Carlton & Garrett 6721* and *6696;* Juab, June 10, 1902, *Goodding 1092;* Big Cottonwood Cañon, Aug. 14, 1905, *Garrett 1614;* Hot Pots, Wahsatch County, *Garrett F726*.

WYOMING: Chug Creek, Albany Co., June 29, 1900, *Aven Nelson 7318* (not *7317*, which is cited by Dr. Wolf under *P. gracilis viridescens*).

PECTINISECTAE

This group contains four species, of which *Potentilla longiloba* is described as new. It resembles *P. Blaschkeana* in habit, but the leaves are loosely villous-tomentose above. The following specimens belong here:

MONTANA: Lo Lo, May 29, 1897, *Elrod and assistants 110;* Gallatin Valley, near Bozeman, 1896, *Flodman 563*, in part.

WASHINGTON: Pullman, June, 1903, *Piper 4134*.

BRITISH COLUMBIA: Near international boundary between Kettle and Columbia rivers, June 25, 1902, *Macoun 63901*.

IDAHO: Clear Water, *Spaulding*.

Dr. Wolf regards *Potentilla ctenophora* as a variety of *P. flabelliformis*, which was also my first idea, before I knew the plant better. Dr. Wolf makes some remarks which read in translation as follows: "The relationship of this variety to var. *typica* seems to me about the same as, for instance, that of *P. argentea* var. *decumbens* to its var. *typica*, and its elevation to specific rank seems to have been made on slight grounds, as the author himself in his monograph says that it should perhaps be regarded as a variety of *P. flabelliformis*, as intermediate forms are not lacking. Why has he not let it remain in its original category? It seems that he makes the limitations of his idea of a species narrower as the years pass by." This may be in a certain sense true, but it has been brought about by a study of many years and the characters stand out better and better as the plants become better known. In this special case Dr. Wolf's remarks were more or less amiss. I do not know what specimens he might have had at hand to support his statements. Neither in the original descriptions of *P. flabelliformis ctenophora* in the Bulletin of the Torrey Botanical Club nor in my monograph, did I cite any specimens. Unfortunately, I forgot to do so. The illustration in the monograph gives only a basal leaf. There is nothing to show the differences in general habit and the flowers. Professor Piper has directed my attention to the fact that my *P. ctenophora* is the same as *P. Blaschkeana* Lehm. Later he has also recorded his views on this point in his Flora of Washington. I agree fully with Professor Piper and have stated before that my conception of *P. Blaschkeana* was a composite one, mainly made up of *P. grosse-serrata*. Dr. Wolf, I think, did not make the same mistake, for his description points unmistakably to *P. Blaschkeana* Turcz., as described and illustrated by Lehmann, not as characterized in my monograph. After the citation of Lehmann's plate, Dr. Wolf gives in parenthesis "(*optima*)". His conception of *P. Blaschkeana* was therefore evidently correct. As my *P. ctenophora* is evidently the same, why should it not be regarded as specifically distinct from *P. flabelliformis*?

Professor Aven Nelson in the New Manual of Botany of the Central Rocky Mountains makes *P. Blaschkeana* a synonym of *P. gracilis* and *P. ctenophora* a synonym of *P. flabelliformis*.

GRACILES

The following species were described as new in the North American Flora: *Potentilla intermittens*, *P. alaskana*, *P. dichroa*, and *P. camporum*.

As stated in the North American Flora, *Potentilla intermittens* may be a hybrid between *P. glaucophylla* and *P. filipes*, so intermediate is it in every respect that a mere glance would suggest its hybrid origin. As I had no direct evidence, however, I proposed a specific name and described it, hoping that botanists might study it further in the field. The following specimens belong here:

COLORADO: Cameron Pass, 1896, *Baker 25;* Buffalo Pass, 1898, *Shear 3863*.

ALBERTA: Foothills, 1897, *Macoun 16722*.

Potentilla alaskana resembles *P. viridescens* in habit but the flowers are much larger, the petals being 9–14 mm. long, the bractlets linear instead of lanceolate, and the leaves densely tomentose beneath. It differs from *P. gracilis* in the lower stem and the appressed pubescence on stems and petioles. Several specimens have been seen, but all were from the Island of Kadiak, Alaska.

Potentilla dichroa is related to *P. glomerata* but differs in the dense white tomentum of the lower surface of the leaves. It differs from *P. gracilis* in the thicker leaves, and in the stouter and lower, more leafy stem, which is appressed-hairy. The following specimens belong here:

MONTANA: Old Sentinel, 1901, *MacDougal 185*.

OREGON: Burns, 1901, *Griffiths & Morris 766*.

The following I have referred here, although they are less typical specimens:

UTAH: Hot Pots, Wahsatch County, 1905, *Garrett F727*.

NEVADA: Washoe Valley, *Stretch 74*.

Potentilla camporum is somewhat intermediate between *P. gracilis* and *P. filipes*, having the toothing of the leaves of the former and the small flowers of the latter. It has much broader, thicker, and more pubescent leaves than the former, more coarsely toothed and more hairy leaves than the latter. The following specimens are referred here:

SOUTH DAKOTA: Black Hills, *Miss Pratt 93*

MANITOBA: Rapid City, 1896, *Macoun 14447* and *14450;* Fort Ellis, 1906, *Macoun & Herriot 68930.*

SASKATCHEWAN: Milk River, 1881, *Dawson 34348;* The Holes, 1885, *Macoun 10447;* Cypress Hills, 1894, *Macoun 4538;* Herzel, 1906, *Macoun & Herriot 69827;* Park Bay, 1896, *Macoun 14447;* Silver City, 1885, *Macoun 635* and *7284.*

BRITISH COLUMBIA: Slotch-oot-a Lake, 1876, *Dawson 7282;* Nicola Valley, *Macoun 7229;* Revelstoke, 1890, *Macoun 7287.*

In 1901, while visiting northern Europe, I found in the Botanical Garden at Upsala specimens of *Potentilla pulcherrima* Lehm., which had been cultivated for several generations since Lehmann's time and kept unchanged the characters of pinnate leaves, etc. Side by side were growing also specimens of the so-called *P. gracilis* from Colorado with its digitate leaves. The latter is of course not the true *P. gracilis* but the *P. pulcherrima* of my monograph or *P. pulcherrima communis* Th. Wolf. Seeing these two forms together, the suggestion came to me that they might not be one species. While collecting in Utah, I found *P. pulcherrima* in the same cañon where Dr. Watson had rediscovered it, viz., in the Big Cottonwood Cañon, southeast of Salt Lake City. Here it was growing alone. Numerous specimens were seen in an open place along the river, but no digitate-leaved specimens were seen. I have come to the conclusion that it is not a parallel case to *P. diversifolia*, in which the basal leaves are either pinnate or digitate or both on the same plant. In all specimens of *P. pulcherrima* proper, the basal leaves are all pinnate, while in *P. pulcherrima communis* they are all digitate. In 1901, I described a supposed new species under the name of *P. filipes*, which Dr. Wolf reduced to a variety of *P. pulcherrima.* I have found that the characters separating *P. filipes* and the so-called *P. pulcherrima* of Colorado do not hold. I therefore united the two into one species under the name of *P. filipes* in the North American Flora. A depauperate high-mountain form of this species is *P. pulcherrima condensata* Th. Wolf.

Professor Nelson in the New Manual of Botany of the Central Rocky Mountains makes not only *P. pulcherrima* and *P. filipes* but also *P. fastigiata* and *P. Blaschkeana* synonyms of *P. gracilis*, a consolidation which goes altogether too far.

LONGIPEDUNCULATAE

This section contains only one species, which Dr. Wolf makes a doubtful variety of *P. gracilis*.

SUBJUGAE

This group also contains only a single species, *Potentilla subjuga*. In my monograph, I included also in this group *P. quinquefolia*, a disposition which Dr. Simmons in the Flora of Ellesmere Land rightly criticizes. This species I transferred in the North American Flora to the CONCINNAE group.

SUBCORIACEAE

This group contains three species, all Mexican. Dr. Wolf calls the group RANUNCULOIDES and includes in it not only these three species, and the BREVIFOLIAE and SUBVISCOSAE groups, but also such diverse plants as *Potentilla Townsendii*, *P. Palmeri*, *P. Ranunculus*, *P. flabellifolia*, *P. fragiformis*, and *P. Sierrae-Blancae*, together with *P. acuminata*, which is a species with pinnate leaves related to *P. saxosa*.

OBOVATIFOLIAE

This group also is Mexican and Central American and consists of three species. The first of these, *P. staminea* Rydb., was until lately known only from the type collection by Ghiesbrecht. It has been collected also in Guatemala, in 1896, *Seler 2753*. If I am not mistaken, they are the same specimens that Dr. Wolf cites under *P. haematochrus* on page 226 of his monograph. A few years after its publication I referred to this species doubtfully *Pringle 6890*. This evidently was the reason why Dr. Wolf reduced *P. staminea* to a variety of *P. leptopetala* Lehm. *Pringle 6890* is evidently much more closely related to *P. leptopetala* than to *P. staminea*. I have been inclined to refer *Pringle 6890* and other material collected later in the same region to *P. leptopetala*, for they agree fairly well with Lehmann's description (except as to the size of the petals). If, however, Lehmann's figure in his Monographia, *pl. 43*, is correct, then the plant from which it was drawn must be of a different species from *Pringle 6890* or else it is a freak or in an abnormal condition. I have seen neither the type of

P. leptopetala, nor the plants collected by Schiede and by Ehrenberg, enumerated in Linnaea. From certain remarks there I have suspected that these specimens belonged rather to the same species as *Pringle 6890* than to the typical *P. leptopetala*. Dr. Wolf, on page 228 of his monograph, also states that these specimens agree very well with *Pringle 6890*. From this I may judge that Dr. Wolf's interpretation of my *P. staminea* is wrong and that his *P. leptopetala staminea* is the same as my *P. obovatifolia*, which was based on *Pringle 6890*. Dr. Wolf has committed another grave blunder, for on page 251 he reduces *P. obovatifolia* to a variety of *P. concinnaeformis*. Here he also cites *Pringle 6890*, overlooking the fact that he had already cited the same number under *P. leptopetala staminea*. When preparing the manuscript for page 228, he evidently had the specimen before him, while when doing the same for page 251, he made use of no specimens and simply made *P. obovatifolia* a variety of *P. concinnaeformis*, because of my statement that it was nearest *P. concinnaeformis* of the CONCINNAE group. From his treatment of *P. concinnaeformis*, it is evident that Dr. Wolf had seen no specimens of that species. All he had to go by was the short description and plate in my monograph. I think it rather audacious to reduce one species to a variety of another, without knowing material of either. The following specimens belong to *P. obovatifolia*:

MEXICO: Sierra de Pachuca, Hidalgo, 1898, *Pringle 6890;* also in 1902, *Pringle 9783;* Cuyamaloya, Hidalgo, 1906, *Pringle 10276*.

HORRIDAE

This group contains two Mexican species, known only from the type collections. *Potentilla horrida* is referred to the HAEMATOCHROAE group by Dr. Wolf, notwithstanding its yellow flowers. *P. durangensis* is described as new in the North American Flora.

RUBRAE

The oldest known species of this group is *Potentilla comarioides* Humb. & Bonp. Unfortunately this universally known name is antedated by one year by *P. rubra* Willd., which name must be adopted. The group contains seven species from northern Mexico and the southwestern United States. Of these, *P.*

madrensis is overlooked by Dr. Wolf. *P. sanguinea* is described as new in the North American Flora.

AUREAE

As treated in the North American Flora, this group contains nine North American species. If one follows Dr. Wolf in laying so much stress on the form of the style, all the American species, except *Potentilla maculata* and *P. Langeana*, should be excluded from the AUREAE group. In this group the styles should be somewhat thickened upward, instead of downward. In some species the styles are perfectly filiform, not thickened either way. The result is that a distinct line can not be drawn between the CONOSTYLAE and the GOMPHOSTYLAE of Dr. Wolf's monograph. In the AUREAE, Dr. Wolf has such diverse species as *Potentilla maculata*, *P. elegans*, *P. Robbinsiana*, and *P. gelida*. Of these, *P. Robbinsiana* at least does not have the styles thickened upwards. The RANUNCULOIDES group of Dr. Wolf is still worse. It contains not only the thick-leaved and thick-rhizomed Mexican and Central American species, of which it was made up in my treatment, and my SUBVISCOSAE and BREVIFOLIAE groups, but also such diverse species as *Potentilla acuminata* Hall (related to *P. saxosa*), *P. flabellifolia* Hook., *P. fragiformis* Willd., *P. Townsendii* Rydb., *P. Palmeri* Th. Wolf, and *P. Sierrae-Blancae* Rydb. *Potentilla emarginata* Pursh is placed with the AUREAE, while the closely related *P. fragiformis* is placed in RANUNCULOIDES. *P. gelida* Mey. is put in the former, and *P. flabelliformis* Hook., which S. Watson and other students of *Potentilla* have not been able to distinguish from it, is put in the latter group; *P. perdissecta* Rydb. or, as Dr. Wolf calls it, *P. diversifolia* var. *decurrens* (Wats.) Th. Wolf, is placed in the MULTIJUGAE, while *P. Ranunculus* Lange, which can be separated from it only by the different root-stock (see below), is placed in the RANUNCULOIDES. *P. Townsendii* and *P. Palmeri* and their relationship I have discussed before. Dr. Wolf's grouping in this case therefore is very artificial and unsatisfactory.

I think that the group as constituted by me is more natural, although it could be subdivided into three subgroups. *Potentilla Sierrae-Blancae* stands alone, is not so closely related to the rest,

and shows many affinities to the CONCINNAE, although it lacks tomentum.

Potentilla maculata and *P. Langeana* are closely related. Dr. Wolf adopts the name *P. alpestris* for the former, claiming that the name *P. maculata* Pourr. probably belongs to *P. pyrenaica* Ram. He does not, however, adopt the name *P. maculata* for the latter, although the name is much older. Dr. Wolf does not admit *P. Langeana* as a distinct species.

The rest of my AUREAE group are closely related. *Potentilla Vreelandii* Rydb. was first described in the North American Flora, and was consequently unknown to Dr. Wolf.

Potentilla diversifolia Lehm. is placed in the MULTIJUGAE group by Dr. Wolf, and under it he recognizes four varieties: *genuina*, *decurrens*, *glaucophylla*, and *jucunda*. It is true that *P. diversifolia* often has at least some of the leaves pinnate, although with closely approximate pairs of leaflets, and that it connects the MULTIJUGAE and the AUREAE groups. The forms regarded as varieties of it by Dr. Wolf have digitate leaves.

Concerning *Potentilla glaucophylla* Lehm., first described as a species and afterwards reduced to a variety of *P. diversifolia* by the author himself, it may be said that although it is very close to some forms of *P. diversifolia*, especially when they bear only digitate leaves, it seems to be more different in the living state than in dried material, and Professor Aven Nelson,* who also has had chance to study them in the field agrees with me in regarding them as distinct.

That Dr. Wolf reduced *Potentilla jucunda* to a variety is probably due to the fact that he had received unusually large specimens of *P. glaucophylla* which were labeled *P. jucunda*. See the remarks in my preceding Notes on Rosaceae.

What I actually described and figured in my monograph of *Potentilla* as *Potentilla decurrens*, was not the same as *P. dissecta decurrens* of S. Watson. My description was, however, made broad enough to include Watson's plant. In 1905, while collecting in Utah, I collected at several places a plant which I regarded as a new species. A closer comparison with Watson's type of *P. dissecta decurrens* (which is a rather poor specimen) revealed my

*See Coult. & Nels. New Man. Cent. Rocky Mts. 257.

mistake. *Potentilla decurrens* of my monograph, and as understood by A. Nelson, *loc. cit.*, or *A. diversifolia* var. *decurrens* Th. Wolf, mainly, is not the same as Watson's plant. It is a plant related to *P. glaucophylla* and *P. Ranunculus*, while the original *P. dissecta decurrens* is related to *P. ovina* J. M. Macoun. In the North American Flora, the former is described under the name *P. perdissecta*.

Potentilla Ranunculus Lange, which Dr. Wolf associates with *P. ranunculoides* H. B. K., is not related to that species but to the one just discussed above and to *P. glaucophylla*. It is hard to distinguish it from these species except by the rootstock, which in *P. Ranunculus* is much branched and creeping and densely covered with scales. This character is found in many arctic plants and is perhaps due to the climatic conditions. *P. Ranunculus* has usually broader leaflets than *P. glaucophylla* and they are less dissected than in *P. perdissecta*.

Potentilla multisecta (S. Wats.) Rydb. is closely related to *P. perdissecta*. Dr. Wolf reduces it back to a variety of *P. dissecta*, as it was originally described by S. Watson. This is really a transfer to another species, for *P. dissecta* of Watson was not the same as *P. dissecta* Pursh, but was *P. diversifolia* Lehm. This transfer is made, although Dr. Wolf expressly states that he has not seen *P. dissecta* Pursh. Professor Nelson, *loc. cit.*, has omitted this species, although it has been collected in Wyoming.

SUBVISCOSAE

Very little can be said about this group, as little material has been received since my monograph and few new facts have been brought to light since that time. Through further study of *Potentilla Wheeleri viscidula*, I have come to the conclusion that it deserves specific rank and it is given such in the North American Flora. Dr. Wolf has made no change in the species of this group, as he had seen specimens of only *P. Wheeleri*. As stated before, he includes the whole group in his RANUNCULOIDES.

CONCINNAE

This group has been a little modified from the treatment in my monograph and a few species have been transferred from other groups.

Potentilla fastigiata Nutt. was transferred from the GRACILES group. Although it connects the CONCINNAE with this group and with the CANDIDAE, and has a more erect stem than the other species, I think, after all, that it should be placed here and that it has its nearest relative in *P. concinnaeformis* Rydb. Dr. Wolf retains it in the GRACILES group and associates it with *P. tomentosa*, *P. oaxacana*, and *P. Nuttallii*. Its nearest relative outside the CONCINNAE is *P. candida* Rydb., and a few of the specimens cited by me under the latter in my monograph belong to *P. fastigiata* instead. It is evidently unknown to Professor Nelson, for under *P. gracilis*, he has the following remark: "(This may be a composite species; as here used it includes the following, which are not readily discriminated: *P. fastigiata* Nutt.; *P. pulcherrima* Lehm.; *P. Blaschkeana* Turcz. . . . .)" The leaves of *P. fastigiata* are silky-villous with rather long hairs on both sides, only very slightly tomentose beneath.

A species related to this and *P. concinnaeformis* is described in the North American Flora under the name of *Potentilla Hassei*. It differs from *P. fastigiata* in the broader, broadly obovate leaflets and the oblong instead of linear-lanceolate bractlets, and from *P. concinnaeformis* in the dense many-flowered inflorescence, the densely pubescent stem, and the oblong bractlets. Besides the type given in the North American Flora, I have seen the following specimens, referable to it:

CALIFORNIA: Head of Stanislaus River, 1903, *Hall & Chandler 4778*.

There has been no change made in *Potentilla concinnaeformis*, *P. oblanceolata*, and *P. bicrenata* since my monograph, except that the range of the last one has been extended to Wyoming, where it has been collected by Professor Nelson. Dr. Wolf admits all three as species, although he had not seen specimens of any of them. Concerning the reduction of *P. obovatifolia* Rydb. to a variety of the first one, see my remarks on page 493.

A further study of *P. concinna* and its variety *divisa* brought to light facts that seemed to me sufficient to warrant the raising of the latter to specific rank.

In the North American Flora, I transfer *Potentilla quinquefolia* Rydb. to this group. In my monograph I had placed it with *P.*

subjuga. My placing it with that species was done simply because both show a tendency to combining digitate and pinnate characters in the leaves. Dr. Simmons in the Flora of Ellesmereland, has rightly criticized me for so doing. The species was based upon *Potentilla nivea pentaphylla* Lehm., as represented by some of the specimens cited in Hooker's Flora Boreali-Americana. Unfortunately Dr. Lehmann did not propose the name in the work just mentioned, although he gave a description. His publication of the variety did not appear until 1850.* In the meantime, the name had been taken up by Turczaninow,† but whether for the same plant or not I can not tell. As the name *pentaphylla* was not available I used another name, *P. quinquefolia*, and it matters little what plant Turczaninow had, as *P. quinquefolia* applies to the North American plant characterized in my description. In 1900 Mr. Morten Pedersen Porsild sent me a collection of Potentillas from Greenland. I undertook to determine them and also published a paper upon them in the Bulletin of the Torrey Botanical Club for March, 1901. Some of the work was hastily done and several corrections to that paper must be made. One of the mistakes made was that I regarded *P. nivea subquinata* Lange as identical with *P. quinquefolia*. Following the Madison amendments to the Rochester Code, I substituted the name *P. subquinata* (Lange) Rydb. for *P. quinquefolia*. *P. nivea*, as well as other 3-foliolate species, has occasionally some of the lower leaves 5-foliolate, but *P. quinquefolia* has them nearly always so. On account of this confusion, I have been severely criticized both by Dr. Simmons and by Dr. Wolf for regarding *P. quinquefolia* Rydb. as a distinct species. The former made the following remarks: "there being not the slightest cause to look upon it as a species as Rydberg has done, probably because he has had no opportunity of studying the plant from nature." If Dr. Simmons had taken a little trouble, he could have found that this statement was not exactly true, for in my monograph, I cited a specimen collected by myself in Montana, viz., *Rydberg & Bessey 4397*, and I had had opportunity to study it in the field. I have since collected it at two other stations, one in Colorado and one in Utah.

*Delect. Sem. Hort. Hamb. **1850**: 12. 1850.

†Bull. Soc. Nat. Mosc. **14**: 607. 1843.

In neither case did I find a single specimen that could be referred to *P. nivea*. At the Colorado station it was associated with *P. saximontana* and *P. uniflora*, but was easy to distinguish, especially from the latter. In the collections at the New York Botanical Garden there are eighteen sheets of *P. quinquefolia*, representing sixteen localities. I have seen perhaps as many more localities represented in other herbaria, and have seen no sheets on which it was mixed with *P. nivea* proper. We have only four sheets of *P. nivea* from the Rocky Mountain region. When I visited Copenhagen in 1901, I confused *P. rubricaulis* with it and named a specimen of the latter *P. subquinata*. This was due mostly to the fact that I had a wrong idea of *P. rubricaulis* Lehm. and had applied the latter name to what appears in the North American Flora as *P. rubripes* Rydb. Dr. Simmons has cleared up *P. rubricaulis* Lehm. in such a way that nothing more needs to be said, except perhaps that he could have made plainer the differences between the trifoliolate *P. rubricaulis* var. *arctica* and *P. nivea* L., taken in such a broad sense as Dr. Simmons has done. Of the specimens collected by Pedersen and referred to *P. subquinata* by me, *no. 496*, as represented in the New York Botanical Garden herbarium, is a form of *P. nivea* L., with some quinate leaves. It is intermediate between *P. nivea macrophylla* and *P. nivea subquinata*. *Nos. 113* and *233* belong to *P. nipharga* Rydb., which also sometimes has quinate leaves. The other numbers are not represented here. There is none referable to *P. quinquefolia*, which seems confined to the Rocky Mountains of the United States and Northwestern Canada.

Closely related to *P. quinquefolia*, perhaps a depauperate variety thereof, is *P. modesta* Rydb., described as new in the North American Flora. It is confined to two mountain chains in Utah. It differs from *P. quinquefolia*, besides in the smaller stature, in the linear and obtuse instead of lanceolate and acute bractlets, the golden yellow petals only 4 mm. long, and the dense inflorescence, reminding one of that of *P. Hookeriana*. The following specimens belong to it:

UTAH: Mount Barrette, July 26, 1905, *Rydberg & Carlton 7261, 7259*, and *7258;* Sierra La Sal, 1899, *C. A. Purpus G, Q*, and *R*.

NIVEAE

This group is represented in the North American Flora by nine species. Of these, two are proposed as new, *P. nipharga* and *P. Pedersenii*, the first based on specimens referred to *P. nivea* and several of its varieties, the latter based on *P. subquinata Pedersenii* Rydb.

Dr. Simmons in his Flora of Ellesmere Land remarked: "Rather might it be justifiable to distinguish all the arctic forms with deeply incised leaflets, from the typical *P. nivea*, which has them more rounded and feebler dentate. I have, however, had too little opportunity to study them from nature, to be able to give any definite opinion about it. . . . Rydberg has, however, not only established a new species *P. quinquefolia* for the plant here in question, but . . . ." If we compare this quotation with the other one from the same discussion given above we notice that Dr. Simmons contradicts himself. In the first quotation he states "there being not the slightest cause to look upon it as a species" and in the latter "rather might it be justifiable to distinguish all the arctic forms. . . ." These arctic forms with deeply incised leaflets, certainly look very different from *P. nivea* proper, but at the same time they are not the same as my *P. quinquefolia*. As I could not find any available name for them I proposed *P. nipharga* in the North American Flora. The plant is not exclusively arctic, for similar specimens, although usually smaller, have been collected in the Rockies, especially in Utah. Some of the specimens included in *P. nivea dissecta* by S. Watson belong here, others belong to *P. divisa* Rydb. The name *dissecta* is, however, not available. *Potentilla nivea subquinata* Lange is probably a form of this with some quinate leaves, but as the name *P. subquinata* has been applied to another species, it is not available for this. It includes probably *P. nivea arenosa* Lange, but it is not *P. nivea arenosa* Turcz. I think that it is *P. nivea pinnatifida* Lange (not that of Lehmann), but *pinnatifida* can not be used as a specific name for it. It is the same as *P. nivea altaica* Rydb., at least as far as the Utah specimens are concerned. I thought that it was the same as *P. altaica* Bunge, but have seen my mistake. I agree fully with the opinion of Dr. Simmons that "it [*P. altaica*] does not belong to *P. nivea*," not even if *P. quinquefolia*, *P. ni-*

pharga, and *P. uniflora* are included. Dr. Simmons states further: "In the Index Kewensis, it is referred to *P. multifida* L., where its right place seems rather to be." This statement was made after Dr. Simmons had seen the original specimens of Bunge. It is not unlikely at all that its relationship is with *P. pinnatifida*, but the plate illustrating it does not resemble so much *P. pinnatifida* as *P. Hookeriana*. The latter is also intermediate between the NIVEAE and the MULTIFIDAE groups, both in habit, the congested inflorescence, and the fusiform style. I can not agree with Dr. Wolf in regarding *P. altaica* as merely a form of *P. nivea pinnatifida* in the sense he uses the name. I refer the following specimens to *P. nipharga*:

MACKENZIE: Fort Good Hope, 1861–2, *I. S. Onion* (type).

ALBERTA: Rocky Mountains, *Drummond 368*.

UTAH: Sierra La Sal, 1899, *C. A. Purpus A*, *C*, *L*, and *H*.

GREENLAND: Vajat-shore, Disco, *Morten Pedersen 113;* Unartuarsuk, Disco, *Morten Pedersen;* Onjigsak, Disco, *Morten Pedersen 233*.

Potentilla Pedersenii Rydb. was based upon *P. subquinata Pedersenii* Rydb. In describing the latter I had only one collection in flower, viz., *Morten Pedersen 470*, and the description was drawn wholly from that. Laying too much stress upon the peculiar rootstock of this species and almost overlooking more essential characters, I referred carelessly to it several sterile specimens with a similar rootstock. These do not belong to it and Dr. Wolf is fully correct in his criticism of me for basing the variety on a mixture and for including in it specimens which he refers to *P. nivea* and var. *subquinata*. The type specimen he regards as a small-flowered *P. Wahliana*. With this I can not agree. It is true that it has something of the habit of *P. Wahliana*, the long hairs, although not yellowish, of that species, and the pubescent upper surface of the leaves; but it does not have the large, broad, and overlapping petals of *P. Wahliana*, or the oval or elliptic obtusish bractlets characteristic of that species and *P. villosa*. It has the flowers of *Potentilla nivea*. It could be a hybrid of *P. nivea* and *P. Wahliana*.

Dr. Wolf regards both *P. uniflora* and *P. Hookeriana* as vari-

eties of *P. nivea*. *P. Hookeriana*, at least, is very distinct, and were it not for the 3-foliolate leaves, I would associate it with the MULTIFIDAE group, especially with *P. pseudosericea* and *P. paucijuga*. The style is just as fusiform as in those species and the inflorescence is compact as in that group, not open as in the typical species of the NIVEAE.

Dr. Wolf also regards *P. prostrata* as a variety of *P. nivea*, in this respect following Dr. Lehmann, but neither Lehmann nor Wolf seems to have seen the type of *P. prostrata* Rottboell. Dr. Wolf refers to it a specimen collected by Morten Pedersen, labeled as *P. quinquefolia* Rydb., but according to Wolf, better referable to *P. nivea macrophylla*. It is probably *Pedersen 496* that is referred to, but this has nothing to do with *P. prostrata* Rottb. The type of the latter is in the herbarium of the Botanical Garden at Copenhagen, where I saw it in 1901 and drew from it the description which is found in the North American Flora. I have seen no other specimen resembling it, and no form of *P. nivea* or of any of the species often included in it approaches it. The leaflets resemble those of *P. gracilis* but are three in number, and the flower and inflorescence are different.

NEW YORK BOTANICAL GARDEN.

Contributions to the Mesozoic flora of the Atlantic coastal plain—VI. Georgia

EDWARD W. BERRY

No fossil plants have been specifically recorded from the coastal plain of Georgia, although several Eocene plant localities are mentioned by McCallie in his Report on the Underground Waters of Georgia* and one of the following Cretaceous localities is mentioned by Veatch in his recent Report on the Clay Deposits of Georgia.† With the exception of this latter locality near Buena Vista in Marion County all of the following localities have been discovered recently by Dr. L. W. Stephenson or the writer.

Both Lower and Upper Cretaceous deposits are present in Georgia, the former, which have thus far proved unfossiliferous, extending entirely across the state along the "fall-line" and the latter extensively developed west of the Ocmulgee River, which is in the central part of the state, being transgressed east of that point by the late Eocene.

These Upper Cretaceous deposits have been divided by Veatch, on lithologic grounds, into five units, which are, from the oldest to the youngest, the Eutaw (=Tuscaloosa formation), Blufftown, Cusseta, Renfroes, and Providence. They emphasize slight alterations in conditions of sedimentation whereby beds predominantly of sand alternate with marl, the Blufftown and Renfroes phases representing the latter type of sediments. These lithologic phases are fairly well defined in the western part of the state but merge toward the eastward into an indivisible series of sands with local clay lenses, for the most part unfossiliferous. The geology of this area, no doubt with a revised nomenclature, will be published shortly by Dr. Stephenson, so that the foregoing very brief outline will suffice in the present connection.

Determinable fossil plants have beeen collected from the following five localities:

*Geol. Surv. Georgia, Bull. 15: 36, 336, 347. 1908.

†Geol. Surv. Georgia, Bull. 18: 88. 1909.

1. *McBride's Ford.*—This locality is in the basal part of the Tuscaloosa formation, on the left bank of Upatoi Creek, about 10 miles southeast of Columbus, in Chattahoochee County. The plants were all collected from one small clay lens and include the following species:

Andromeda cretacea Lesq?
Andromeda Wardiana Lesq.
Androvettia sp. nov.
Aralia sp. nov.
Brachyphyllum macrocarpum Newb.
Cinnamomum Heerii Lesq.?
Cinnamomum intermedium Newb.
Eucalyptus angusta Velen.
Ficus ovatifolia Berry.
Juglans arctica Heer?
Magnolia Boulayana Lesq.
Magnolia Capellinii Heer.
Manihotites sp. nov.
Menispermites sp. nov.
Paliurus sp. nov.
Salix flexuosa Newb.
Sequoia Reichenbachi (Gein.) Heer.
Tumion carolinianum Berry?
Zizyphus sp. nov.

The *Sequoia* and *Androvettia* are the most abundant forms and the horizon indicated by the general facies of the foregoing 19 species is one homotaxial with the Tuscaloosa formation of Alabama, the Black Creek formation of the Carolinas, the Magothy formation of the northern coastal plain, and the Dakota-Woodbine formations of the western Gulf and interior.

2. *Broken Arrow Bend.*—This locality is on the left bank of the Chattahoochee River about 13 miles below Columbus in Chattahoochee County, and the flora, as at the preceding locality, comes from small clay lenses near the base of the Tuscaloosa formation. The following species have been recognized:

Malapoenna horrellensis Berry?
Phragmites Prattii Berry.
Salix eutawensis Berry.
Salix flexuosa Newb.
Sequoia Reichenbachi (Gein.) Heer.

The *Sequoia* is characteristic and is the most abundant form present. The horizon indicated is the same as in the preceding case.

3. *Chimney Bluff.*—This locality is on the left bank of the Chattahoochee River about 22 miles below Columbus and still in Chattahoochee County. The plants from this locality are near

the top of the Tuscaloosa formation and include the following species:

Araucaria bladenensis Berry.
Araucaria Jeffreyi Berry.
Ficus crassipes Heer.
Ficus Krausiana Heer.
Salix flexuosa Newb.
Salix Lesquereuxii Berry.
Sequoia Reichenbachi (Gein.) Heer.

The *Sequoia* is rare at this outcrop and *Araucaria bladenensis* is the most abundant form. The indicated horizon does not differ greatly from that of the preceding localities.

4. *Near Buena Vista.*—This locality is in a gully along the Buena Vista-Tazewell road, about 6 miles northeast of the former town in Marion County. The horizon is that of the so-called Cusseta sands and the following identifiable species, based on poor and scattered material, indicate a flora not appreciably different from the preceding:

Andromeda Novae-Caesareae Hollick.
Araucaria bladenensis Berry.
Eucalyptus angusta Velen.
Ficus sp. nov.
Manihotites sp. nov. (same as at McBride's Ford).
Monocotyledon, gen. et sp. nov. (common to the Black Creek and Tuscaloosa formations).

5. *Near Byron.*—This locality is in a cut of the Central of Georgia Railway about 1.5 miles northeast of Byron in Houston County. The specimens are few and poor but point to a correlation with the Cusseta sands near Buena Vista. The following have been identified, of which the *Cunninghamites* is the most abundant:

Araucaria Jeffreyi Berry.
Cunninghamites elegans (Corda) Endl.
Dryopteris sp. nov.

When this Upper Cretaceous flora, which consists of but 32 determinable species, is compared with allied floras one is struck with its paucity. For example, the Tuscaloosa flora of Alabama probably contains about 200 species, the Black Creek flora of the Carolinas about 100 species and the Magothy flora considerably more than 100 species. It is evident that the Georgia flora presents but a meager picture of the contemporaneous vegetation of the Piedmont area of Georgia. Another noticeable feature is

the coriaceous nature of most of the leaves. The conifers, which are among the slowest plants to succumb to maceration, are the most abundant types, and the various andromedas, magnolias, and lanceolate leaves of *Ficus* are also very resistant. The conclusion is obvious that all of the more delicate plant remains that floated into the Cretaceous sea were destroyed, and this is corroborated by the character of the sediments, which are predominantly sandy and indicate deposition in shallow much agitated waters. Possibly the Cretaceous coast-line in this region was not broken by any re-entrants of any size, which usually offer exceptional opportunities for the formation of bars and lagoons and the resulting mud-flats, which furnish such excellent facilities for the preservation of the terrestrial vegetation supplied by the tributary rivers. We know that vegetable matter was abundant in these Cretaceous waters from the lignitic character of many of the sands and from the dark carbonaceous clays, but the bulk of it was evidently thoroughly triturated and comminuted before entombment. Possibly too, subsequent erosion of the landward margins of the sediments may account for the absence of land plants, since at McBride's Ford near the landward margin of the deposits they are so much more abundant than at any of the other localities.

These thirty-two Georgia Cretaceous species are distributed among seventeen families in fifteen orders. They include a single polypodiaceous fern and seven species of conifers, most of the latter apparently referable to the Araucarieae, although the relatively primitive Taxaceae are represented by a species of *Tumion*. There are two monocotyledons of little significance and twenty-two dicotyledons of various affinities, including four figs, three willows, three andromedas, two magnolias, and two cinnamomums.

Perhaps the most remarkable form collected is a new species of Euphorbiaceae, very similar to the modern tropical genera *Jatropha* and *Manihot*. These leaves are of immense size and are represented in the collections by the two nearly complete leaves, restorations of which are here figured, and by a number of fragments. This species, which is unlike anything previously known either in this country or abroad, may be briefly characterized as follows:—

Manihotites georgiana gen. et sp. nov.

Leaves large, 36 cm. to 48 cm. in diameter, palmately and deeply lobate, the main lobes dichotomously sublobate. Base probably peltate. Margins entire, more or less undulate. Texture coriaceous. Venation coarse, consisting of five or six stout primaries diverging at acute angles from the top of the petiole, these forking dichotomously about five or six centimeters above their base at angles of from 30° to 50°; the branches sometimes again forking dichotomously in a distance of from four to six centimeters, or simple, or with branches clearly subordinate in

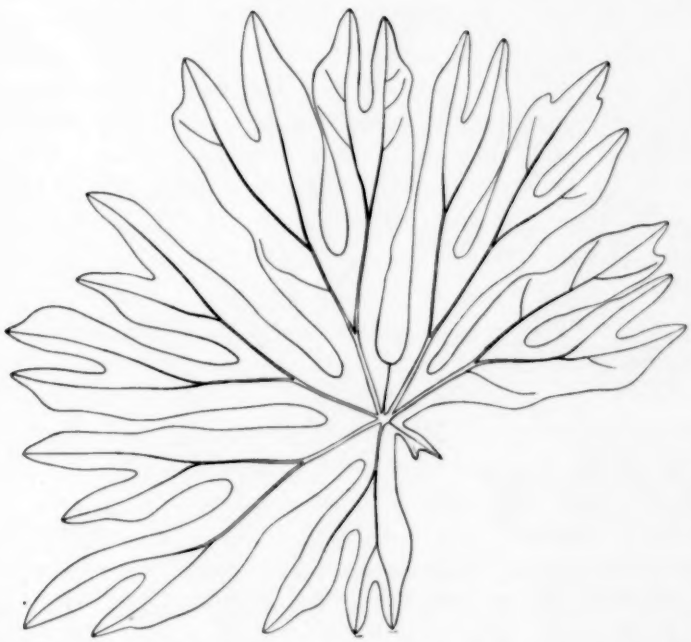

FIGURE 1. Restoration of *Manihotites georgiana* Berry, from the Upper Cretaceous of Georgia. (×¼)

size and running to the apex of a subordinate lobe. There are a sparse number of relatively fine secondaries diverging at angles of about 45° or more and apparently camptodrome. The deep and narrow but rounded sinuses approach to within three to five centimeters of the base and divide the leaf into five or more major lobes and these are subdivided by more or less deep sinuses of a similar character into inequilateral, ovate-lanceolate, obtusely pointed, subordinate lobes. [FIGURES 1 and 2.]

There was considerable variation in the lobation of these leaves as is shown by the specimens figured. It seems very probable that these two leaves were from a single plant, since it is very unlikely that two separate leaves of this size and of the same degree of preservation would have found their way out into the Cretaceous sea and have come to rest within a few inches of one another in this very small clay lens which was not over ten feet in diameter and which was several miles from the Cretaceous shore. The one leaf has the lobes broadly rounded and each main lobe divided

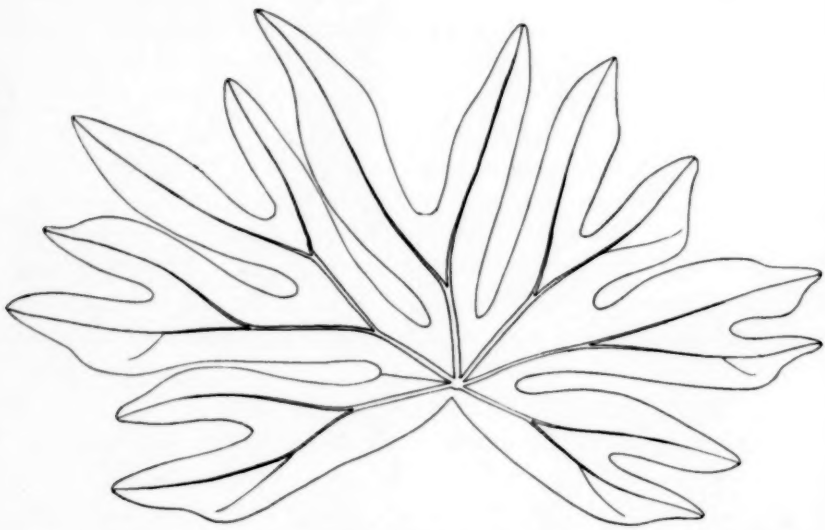

FIGURE 2. Restoration of a second nearly complete leaf of *Manihotites georgiana* Berry, from the Upper Cretaceous of Georgia. (× 1/3.33)

into two nearly equal subordinate lobes, while in the other leaf these subordinate lobes are subdivided in a like manner and some of these subdivisions are again subdivided.

The only fossils that are at all comparable to this species are, first, the forms from the Raritan formation in New Jersey described by Professor Newberry as *Fontainea grandifolia*;* second, those named *Haliserites Reichii* by Sternberg† from their supposed algal nature, although they are clearly angiospermous as Rothpletz has

*Newberry, Fl. Amboy Clays 96. *pl. 45. f. 1–4.* 1896.
†Sternberg, Fl. Vorwelt **2**: 34. *pl. 24. f. 7.* 1833.

recently pointed out.* The latter fossils come from the Cenomanian of Saxony, while a third form, suggestive of the Georgia fossils from the Cenomanian of Bohemia, is called by Velenovsky *Aralia furcata*.†

The Georgia plant is, however, entirely distinct from any of these forms and it has been compared with a large amount of recent material such as *Jatropha*, *Cecropia*, various tropical *Araliaceae*, etc. It proves to be closest, however, to certain species of the genus *Manihot* of Adanson and it is believed that the remarkably variable leaves in the latter genus furnish a satisfactory clue to the relationship of this Cretaceous species, since no other comparable modern genus has leaves with similar wavy margins and inequilateral rounded lobes. This relationship is indicated in the generic name chosen for the Georgia fossils. The modern genus *Manihot* has between eighty and one hundred species in the American tropics.

An effort to picture accurately the environment of this flora is beset with unusual difficulties, as may be imagined from what has already been said. It is safe to assume that the climate was mild and humid, the latter being probably the most important factor aside from the absence of frost. That the temperature was not tropical in character we may assume from the manner in which this flora preserves its integrity when traced northward over a good many degrees of latitude. Judged by the facts of the present-day geographical distribution of plants, this flora presents an antipodean facies with its *Eucalyptus* and abundant Araucarieae, but this is only another way of emphasizing its Mesozoic character, since the abundant evidence at our command shows that both of these types were practically cosmopolitan in the Mesozoic. Another feature, strange in the eyes of modern plant geographers is the curious mingling of forms which in the existing flora are to a greater or less extent climatically segregated. Willows and walnuts growing with figs, eucalypts, laurels, and araucarias would indeed be anomalous in the present flora, but this and similar associations are familiar enough in fossil floras not only during the Mesozoic but well into the Cenozoic.

*Rothpletz, Zeits. Deutsch. Geol. Gesells. **48**: 904. 1896.

†Velenovsky, Fl. Böhm. Kreidef. **3**: 13. *pl. 4. f. 1.* 1884.

Even though no close comparisons with modern ecological groups are possible it would seem that if the Upper Cretaceous flora were existing at the present time it would be included by ecological botanists under that somewhat elastic head which Schimper calls "temperate rain-forests." In no other modern plant associations do we find that commingling of temperate and tropical types that we find in certain present-day temperate rain-forests, as for example those of southern Chile, southern Japan, northern Australia, and New Zealand. In the last mentioned we find aralias, laurels, *Cinnamomum*, *Magnolia*, and *Sterculia* associated with *Quercus*, *Fagus*, *Gleichenia*, *Dryopteris*, *Dicksonia*, etc. In some respects this type in New Zealand is the most tropical in its facies and more like our eastern American Upper Cretaceous floras than any other existing flora. In New Zealand conifers are abundant and include forms with reduced leaves like *Libocedrus* and *Dacrydium*, as well as forms with broad leaves like *Dammara*, *Podocarpus*, and *Phyllocladus*. Dicotyledonae are numerous and varied, including between 100 and 150 species, among which forms of Myrtaceae, Lauraceae, Proteaceae, etc., with coriaceous leaves are prominent. The undergrowth is rich in tree-ferns and various genera of Araliaceae.

When this modern flora is compared element for element with the coastal plain Cretaceous flora many differences naturally become apparent, nevertheless the resemblance between the two is remarkable. In the coastal plain Cretaceous floras the narrow or scale-leaved conifers are represented by *Sequoia*, *Moriconia*, *Brachyphyllum*, and *Widdringtonites*. *Dammara* represents the broad-leaved araucarias, while *Androvettia* and *Protophyllocladus* represent the modern *Phyllocladus*. The dicotyledons are numerous and varied with a mixing of temperate and tropical types and with numerous coriaceous forms belonging to a number of the same families as do the New Zealand plants. Aralias are common in the former as in the latter. That the Cretaceous rainfall was plentiful may be inferred, not only from the species of plants preserved, but also from the formation of dripping points on various leaves, this feature being especially emphasized in the Tuscaloosa flora of Alabama, although it is often obscured by the facility with which these long slender tips are broken off by current action before entombment.

The present brief note is in the nature of an abstract of a full discussion of the Georgia flora which will be published by the U. S. Geological Survey, to the Director of which the writer is indebted for the permission to publish the present paper, setting forth such conclusions as seemed to be of especial botanical interest.

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Additions to the flora of peninsular Florida

II. NATURALIZED SPECIES

JOHN K. SMALL

The plants recorded in the following list represent species chiefly new to the hitherto known flora of the United States. Two of the species have been established on the Florida Keys for many years, and two have been collected in other parts of the United States. The others have been brought into peninsular Florida from many foreign countries and only recently established themselves as members of our naturalized flora. The specimens were for the most part secured through explorations in Florida maintained by the New York Botanical Garden.

CYPERUS ALTERNIFOLIUS L.

It was a surprise to find this African plant established in the Everglades. In company with Mr. J. J. Carter, I discovered it growing in the front prairie at a point about five miles south of Black Point Creek and two miles east of Naranja. The plant was evidently carried there through the agency of animals. Specimens were collected on January 14, 1909, *Small & Carter 2911*.

RHOEO DISCOLOR (L'Her.) Hance

This species, commonly cultivated in Florida, has begun to establish itself beyond the limits of the gardens, and should now be recognized as a member of our wild flora.

The writer collected specimens in pinelands about Miami in November, 1904, *Small 2295*, while Mr. A. A. Eaton discovered naturally self-supporting plants at Chatham Bay, on the opposite side of the state, in the spring of 1905.

ANEILEMA NUDIFLORUM R. Br.

This East Indian plant is now thoroughly established about Braidentown, Florida, and is said to be spreading rapidly. Mr. J. H. Simpson has had it under observation for several years past

and reports that it has now become a permanent member of the flora of this continent.

ZEBRINA PENDULA Sch.

A copious growth of this species was discovered in the heart of a dense hammock near the beach south of Palm Beach, Florida, in November, 1904, *Small 2168*. If the species is not indigenous it was doubtless carried to where I found it by birds or by other animals.

ANANAS ANANAS (L.) Lyons

The pineapple has become spontaneous on the mainland as well as on the Florida Keys, particularly in abandoned fields and adjacent pinelands.

SANSEVIERA GUINEENSIS Willd.

This African plant, now widely cultivated in the tropics, is naturalized in peninsular Florida, and Dr. Britton also found it growing in waste places in Key West in the spring of 1903.

MUSA SAPIENTUM L.

The common banana has established itself in low hammocks near Miami. It is abundant between Cocoanut Grove and Cutler, and thrives particularly well in Snapper Hammock. Specimens were collected there in November, 1904, *Small 2254*.

MUSA CAVENDISHII Lamb.

The dwarf banana, now widely cultivated in southern Florida, is also naturalized. It is not uncommon in waste and abandoned grounds about Miami, and I have observed it at points farther north along the east coast. Specimens were collected in Snapper Hammock between Cocoanut Grove and Cutler in November, 1904, *Small 2251*.

ALPINIA SPECIOSA (Wendl.) Schum.

Recent exploration in the Everglades has discovered this East Indian plant as a naturalized member of our flora. Mr. J. J. Carter and the writer found the plants established in hammocks between Perrine and Cutler on November 16, 1906, *no. 2469*.

ACHYRANTHES ASPERA L.

This tropical American plant was found in the Brickel Hammock near Miami on February 20, 1905, by Mr. A. A. Eaton (*no. 1188*). This collection adds a second species of the genus *Achyranthes* to our flora. *Achyranthes obtusifolia* was collected on Key West several years before.

GOMPHRENA DECUMBENS Jacq.

A native of Mexico, or perhaps of Texas and Mexico, this relative of the Bachelors Button, *Gomphrena globosa*, has been introduced into other countries chiefly through its cultivation in gardens. As early as 1897 Mr. N. K. Berg collected specimens at Tampa, and in 1903 Dr. Britton collected specimens in the same region, *no. 80*.

CLITORIA TERNATEA L.

This plant, originally from the East Indies, but now widely dispersed through the tropics, has escaped from cultivation in Florida. Specimens were collected by the writer in pinelands between Cocoanut Grove and Cutler in November, 1904, *no. 2225*.

CAJAN CAJAN (L.) Pollard

Within the last few years this species has escaped from cultivation and established itself in several localities in the vicinity of Miami. Collections were recently made as follows:

Pinelands between Cocoanut Grove and Cutler, *Small 2229*.
Pinelands about Arch Creek, *Small 2305*.

DOLICHOS LABLAB L.

The hyacinth bean, grown in Florida both as an ornamental and an esculent plant, has become established as a member of our flora. Specimens were collected by the writer about Miami in November, 1904.

PHASEOLUS VULGARIS L.

The common bean has established itself in southern Florida. It occurs not only in waste grounds, but also in the pinelands remote from settlements or other human habitations. Its occur-

rence in the pinelands may be accounted for by the former existence of camps. Specimens were collected in pinelands between Cocoanut Grove and Cutler in the fall of 1903, *Small & Carter 1280*.

PHASEOLUS LUNATUS L.

The Lima bean became naturalized in Florida under the same conditions as the *Phaseolus vulgaris*. Specimens were collected on hammock islands between Homestead and Cross Key in the fall of 1906, *Small & Carter 2572*. The plant occurs under nearly similar conditions on Andros, Bahamas.

CICCA DISTICHA L.

This native of the East Indies, known as the Otaheite gooseberry, now widely cultivated in the tropics, has escaped from cultivation in South Florida, where it is grown for its fruits, which are used as a substitute for gooseberries. Specimens were collected in pinelands near Miami in November, 1904, *Small 2227*.

Breynia nivosa (W. G. Smith) Small, comb. nov.

Phyllanthus nivosus W. G. Smith

This plant, very commonly cultivated in gardens, and particularly used for hedges, in southern Florida, where it grows luxuriantly, has begun to spread beyond the limits of cultivated grounds. It makes itself perfectly at home in the pinelands and on the edges of hammocks. Specimens were collected near Miam in November, 1904, *Small 2218*. The plant is also becoming naturalized in the West Indies.

THESPESIA POPULNEA (L.) Soland.

Although introduced on the Florida Keys long ago and growing naturally there for many years, this shrub or tree apparently did not reach the mainland until recently. Specimens were collected along the shore of Biscayne Bay near Cutler in 1905, by Dr. S. H. Richmond, of Cutler. The fruits from which these trees originated were evidently floated across the bay from the Keys.

HIBISCUS SABDARIFFA L.

The roselle or Jamaica sorrel, cultivated in southern Florida for its edible flowers, has become established in pinelands and waste

places about Miami. The plant is a vigorous grower and thrives exceedingly well in that region. Specimens were collected there in November, 1904, *Small 2280*.

HIBISCUS CANNABINUS L.

The ambaree or brown Indian hemp is naturalized in both pinelands and about hammocks in southern Florida. Specimens were collected near Miami in the fall of 1903 by the writer and Mr. J. J. Carter.

HIBISCUS ROSA-SINENSIS L.

The Chinese rose or shoe-black plant, cultivated throughout peninsular Florida, chiefly for its showy flowers, is naturalized, especially in the southern portions of the peninsula. We have specimens collected on the west coast at Pinellas, by Mr. Otto Frank and on the east coast about Miami by the writer.

JASMINUM GRANDIFLORUM L.

This widely cultivated tropical plant has escaped from cultivation and is growing spontaneously in the pinelands north and south of Miami. Specimens were collected at two stations in November, 1904:

Between Cocoanut Grove and Cutler, *Small 2223*.

About Arch Creek, *Small 2307*.

ANGELONIA ANGUSTIFOLIA Benth.

This tropical American plant, commonly cultivated in gardens, has become established as a member of our wild flora in southern peninsular Florida. Specimens were collected in Dade County, in December, 1903, by Mr. A. A. Eaton, *no. 872*.

RUSSELLIA JUNCEA Zucc.

This Mexican shrub, commonly cultivated in gardens, has now become established in peninsular Florida. Professor P. H. Rolfs reports it as especially plentiful about towns on the west coast.

THUNBERGIA FRAGRANS Roxb.

Several species of *Thunbergia* are generally cultivated in Florida, but only one seems to have become naturalized. The species cited above was collected growing wild in waste places

as early as 1894, at Eustis, *Nash 728*. The writer has observed it in similar localities at several towns in the peninsula.

PAEDERIA FOETIDA L.

This vine, remarkable for the very offensive odor of its foliage when bruised, has become established about Sanford. Specimens were collected there by Mr. S. Rapp in 1903.

TRIDAX PROCUMBENS L.

This tropical American species, hitherto known as a member of our flora only from the Florida Keys, is now very plentiful and permanently established in southern peninsular Florida. Specimens have been collected as follows:

Miami, November, 1903, *Small & Carter*.

Dade County, December, 1903, *Eaton 458*.

Between Cocoanut Grove and Cutler, November, 1904, *Small 2230*.

Near Arch Creek, Dade County, November, 1904, *Small 2245*.

EMILIA SONCHIFOLIA (L.) DC.

This plant of the old world tropics is now firmly established in southern Florida, where the following collections have been made:

Dade County, *Eaton 1150*.

Palm Beach, *Small 2129*.

Between Miami and Kendall Station, *Small & Carter 2755*.

NEW YORK BOTANICAL GARDEN.

INDEX TO AMERICAN BOTANICAL LITERATURE

(1910)

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in its broadest sense.

Reviews, and papers which relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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